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2 1. A method for monitoring, measuring and capturing transactions in a
3 communication network experienced by a user of a communication device
4 operating in the communication network, said method comprising:

5 monitoring a plurality of transactions occurring between a user of a
6 communication device operating in a communication network and the
7 communication network in accordance with a functional definition of a probe
8 element of the communication device, wherein the plurality of transactions are
9 at least a portion of the user's interaction with the communication network via
10 the communication device and wherein the functional definition of the probe
11 element is operable to be dynamically and remotely configured by the
12 communication network via a communication link between the communication
13 device and the communication network;

14 capturing the plurality of transactions in accordance with the functional
15 definition of the probe element; and

16 measuring one or more characteristics of the plurality of transactions to
17 generate user interaction data in accordance with the functional definition of
18 the probe element.

19

20 2. The method of claim 1, further comprising prior to said monitoring:

21 defining the functional definition of the probe element in accordance
22 with the type of user interaction data desired to be generated for the
23 communication device.

24

25 3. The method of claim 2, further comprising:

26 downloading the probe element to the communication device from the
27 communication network via the communication link.

28

29 4. The method of claim 1, further comprising:

- 1 4. The method of claim 1, further comprising:
2 transmitting the user interaction data to the communication network in
3 response to at least one of the functional definition of the probe element and a
4 request from the communication network.
5
- 6 5. The method of claim 1, further comprising prior to said monitoring:
7 downloading the probe element from the communication network via
8 the communication link.
9
- 10 6. The method of claim 1, wherein the communication device operates in
11 a non-interactive mode of operation in which the user interaction data is
12 generated in a manner that is transparent to the user of the communication
13 device.
14
- 15 7. The method of claim 1, further comprising:
16 a network operator of the communication network dynamically
17 controlling operation of the communication device in a diagnostic mode of
18 operation in accordance with a diagnostic criterion.
19
- 20 8. The method of claim 7, further comprising:
21 the network operator controlling the communication device to perform
22 diagnostic tests of one or more network performance problems capable of
23 being monitored by the communication device in accordance with the
24 diagnostic criterion.
25
- 26 9. The method of claim 7, further comprising:
27 when not in the diagnostic mode of operation the communication
28 device operating in a non-interactive mode of operation during which the
29 plurality of transactions are monitored and captured and the user interaction

1 data is generated in a manner that is transparent to the user of the
2 communication device.

3

4 10. The method of claim 7, further comprising:

5 when not in the diagnostic mode of operation the communication
6 device operating in a quasi-interactive mode of operation during which the
7 plurality of transactions are monitored and captured and the one or more
8 characteristics of the plurality of transactions are monitored by the probe
9 element to generate the user interaction data and during which the user can
10 decide when to report to the network operator one or more network
11 performance problems identified in the user interaction data.

12

13 11. The method of claim 7, further comprising:

14 the user of the communication device granting permission to the
15 network operator to control the communication device to perform diagnostic
16 tests while in the diagnostic mode of operation.

17

18 12. The method of claim 7, further comprising:

19 downloading the diagnostic criterion from the communication network
20 to the probe element via the communication link.

21

22 13. The method of claim 12, wherein the communication link comprises the
23 Internet.

24

25 14. The method of claim 1, further comprising:

26 the communication device operating in a quasi-interactive mode of
27 operation during which the plurality of transactions are monitored and
28 captured and the one or more characteristics of the plurality of transactions
29 are measured by the probe element to generate the user interaction data and

- 1 during which the user can decide when to report to the network operator one
- 2 or more network performance problems identified in the user interaction data.
- 3
- 4 15. The method of claim 14, further comprising:
- 5 the user of the communication device previously deciding that the
- 6 communication device will operate in the quasi-interactive mode of operation.
- 7
- 8 16. The method of claim 1, wherein the user interaction data comprises
- 9 network engineering data.
- 10
- 11 17. The method of claim 1, wherein the user interaction data comprises
- 12 user profile data.
- 13
- 14 18. The method of claim 1, wherein the user interaction data comprises
- 15 one or more of network engineering data and user profile data.
- 16
- 17 19. The method of claim 1, further comprising:
- 18 programming the probe element with the functional definition.
- 19
- 20 20. The method of claim 19, wherein the programming of the probe
- 21 element is provided by the communication network.
- 22
- 23 21. The method of claim 20, wherein the programming is provided by the
- 24 communication network via the communication link and is capable of being
- 25 dynamically changed by the communication network.
- 26
- 27 22. The method of claim 21, wherein the programming of the probe
- 28 element is dynamically changed by the communication network via the
- 29 communication link in response to the user interaction data.

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2 23. The method of claim 1, wherein the plurality of transactions comprise
3 one or more of voice communications and data communications between the
4 user of the communication device and the communication network.

5

6 24. The method of claim 1, further comprising:

7 performing one or more diagnostic tests of the communication network
8 in a diagnostic mode of operation in accordance with a diagnostic criterion
9 downloaded to the communication device from the communication network
10 via the communication link in response to the communication network
11 identifying one or more network performance problems from the user
12 interaction data.

13

14 25. The method of claim 1, further comprising:

15 transmitting the generated user interaction data from the
16 communication device to a collection communication device of the
17 communication network.

18

19 26. The method of claim 1, further comprising:

20 receiving multiple user interaction data from one or more additional
21 communication devices in the communication network;

22 aggregating the multiple user interaction data to generate aggregate
23 user interaction data; and

24 transmitting the aggregate user interaction data to the communication
25 network via the communication link.

26

27

- 1 27. The method of claim 1, further comprising:
2 transmitting the user interaction data to the communication network in
3 response to at least one of the functional definition of the probe element and a
4 request from the communication network; and
5 analyzing the user interaction data to identify one or more network
6 performance problems of the communication network.
7
- 8 28. The method of claim 27, further comprising:
9 implementing changes to operation of the communication network to
10 counter the one or more identified network performance problems and
11 improve communications in the communication network from the perspective
12 of the user of the communication device.
13
- 14 29. The method of claim 27, further comprising:
15 generating one or more network performance problem reports
16 comprising the one or more network performance problems identified.
17
- 18 30. The method of claim 27, further comprising:
19 the communication device performing one or more diagnostic tests of
20 the communication network in a diagnostic mode of operation in accordance
21 with a diagnostic criterion downloaded to the communication device from the
22 communication network via the communication link in response to the one or
23 more network performance problems identified during analysis of the user
24 interaction data.
25
- 26 31. The method of claim 27, wherein transmitting the user interaction data
27 to the communication network comprises:
28 transmitting the user interaction data to a collection communication
29 device of the plurality of communication devices which transits the user

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1 interaction data to a server of a network operator of the communication
2 network.

3

4 32. The method of claim 27, wherein transmitting the user interaction data
5 to the communication network comprises:

6 receiving multiple user interaction data from other communication
7 devices of the plurality of communication devices in the communication
8 network;

9 aggregating the multiple user interaction data with the user interaction
10 data generated by the communication devices to generate aggregate user
11 interaction data; and

12 transmitting the aggregate user interaction data to the communication
13 network via the communication link.

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1

2 33. A method for improving communications of a communication network
3 having a plurality of communication devices by which a plurality of
4 corresponding user communicate in the communications network, said
5 method comprising:

6 for each communication device of the plurality of communication
7 devices:

8 monitoring a plurality of transactions occurring between a user
9 of a communication device operating in a communication network and
10 the communication network in accordance with a functional definition of
11 a probe element of the communication device, wherein the plurality of
12 transactions are at least a portion of the user's interaction with the
13 communication network via the communication device and wherein the
14 functional definition of the probe element is operable to be dynamically
15 and remotely configured by the communication network via a
16 communication link between the communication device and the
17 communication network;

18 capturing the plurality of transactions in accordance with the
19 functional definition of the probe element;

20 measuring one or more characteristics of the plurality of
21 transactions to generate user interaction data in accordance with the
22 functional definition of the probe element;

23 transmitting the user interaction data to the communication
24 network in response to at least one of the functional definition of the
25 probe element and a request from the communication network;

26

27 the communication network aggregating the user interaction data
28 received from one or more communication devices of the plurality of
29 communication devices to generate statistical information about the

- 1 communication network; and
- 2 the communication network analyzing the statistic information to
- 3 identify one or more network performance problems of the communication
- 4 network.
- 5
- 6 34. The method of claim 33, further comprising prior to said monitoring:
- 7 downloading the probe element to the communication device from the
- 8 communication network via the communication link.
- 9
- 10 35. The method of claim 33, further comprising after said analyzing:
- 11 implementing changes to operation of the communication network to
- 12 counter the one or more identified network performance problems and
- 13 improve communications in the communication network from the perspective
- 14 of one or more of the user of the one or more communication devices.
- 15
- 16 36. The method of claim 33, further comprising after said analyzing:
- 17 generating one or more network performance problem reports
- 18 comprising the one or more network performance problems identified.
- 19
- 20 37. The method of claim 33, further comprising prior to said monitoring:
- 21 defining the functional definition of the probe element in accordance
- 22 with the type of user interaction data desired to be generated for the
- 23 communication device.
- 24
- 25 38. The method of claim 37, further comprising:
- 26 downloading the probe element to the communication device from the
- 27 communication network via the communication link.
- 28
- 29 39. The method of claim 33, wherein the communication device operates in

1 a non-interactive mode of operation in which the user interaction data is
2 generated in a manner that is transparent to the user of the communication
3 device.

4
5 40. The method of claim 33, further comprising:

6 a network operator of the communication network dynamically
7 controlling operation of the one or more communication devices in a
8 diagnostic mode of operation in accordance with a diagnostic criterion.

9
10 41. The method of claim 40, further comprising:

11 the network operator controlling the one or more communication
12 devices to perform diagnostic tests of the one or more network performance
13 problems capable of being monitored by the one or more communication
14 devices in accordance with the diagnostic criterion.

15
16 42. The method of claim 40, further comprising:

17 when not in the diagnostic mode of operation the one or more
18 communication devices operating in a non-interactive mode of operation
19 during which the plurality of transactions are monitored and captured and the
20 user interaction data is generated in a manner that is transparent to the users
21 of the one or more communication devices.

22
23 43. The method of claim 40, further comprising:

24 when not in the diagnostic mode of operation the one or more
25 communication devices operating in a quasi-interactive mode of operation
26 during which the plurality of transactions are monitored and captured and the
27 one or more characteristics of the plurality of transactions are monitored by
28 the probe element to generate the user interaction data and during which
29 users of the one or more communication devices can decide when to report to

1 the network operator one or more network performance problems identified in
2 the user interaction data.

3
4 44. The method of claim 40, further comprising:

5 the users of the one or more communication devices granting
6 permission to the network operator to control the communication device to
7 perform diagnostic tests while in the diagnostic mode of operation.

8
9 45. The method of claim 40, further comprising:

10 downloading the diagnostic criterion from the communication network
11 to the probe element via the communication link.

12
13 46. The method of claim 45, wherein the communication link comprises the
14 Internet.

15
16 47. The method of claim 33, further comprising:

17 the one or more communication devices operating in a quasi-
18 interactive mode of operation during which the plurality of transactions are
19 monitored and captured and the one or more characteristics of the plurality of
20 transactions are measured by the probe element to generate the user
21 interaction data and during which users of the one or more communication
22 devices can decide when to report to the network operator one or more
23 network performance problems identified in the user interaction data.

24
25 48. The method of claim 47, further comprising:

26 the users of the one or more communication devices previously
27 deciding that the one or more communication devices will operation in the
28 quasi-interactive mode of operation.

29

- 1 49. The method of claim 33, wherein the user interaction data comprises
2 network engineering data.
3
- 4 50. The method of claim 33, wherein the user interaction data comprises
5 user profile data.
6
- 7 51. The method of claim 33, wherein the user interaction data comprises
8 one or more of network engineering data and user profile data.
9
- 10 52. The method of claim 33, further comprising:
11 programming the probe element with the functional definition.
12
- 13 53. The method of claim 52, wherein the programming of the probe
14 element is provided by the communication network.
15
- 16 54. The method of claim 53, wherein the programming is provided by the
17 communication network via the communication link and is capable of being
18 dynamically changed by the communication network.
19
- 20 55. The method of claim 54, further comprising:
21 the communication network dynamically removing the probe element
22 via the communication link.
23
- 24 56. The method of claim 54, wherein the programming of the probe
25 element is dynamically changed by the communication network via the
26 communication link in response to the user interaction data.
27
- 28 57. The method of claim 33, wherein the plurality of transactions comprise
29 one or more of voice communications and data communications between the

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1 user of the communication device and the communication network.

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3 58. The method of claim 33, wherein each communication device transmits
4 the user interaction data to a server of the communication network.

5

6 59. The method of claim 33, wherein analyzing the user interaction data is
7 performed by a network operator of the communication network.

8

9 60. The method of claim 33, wherein aggregating the user interaction data
10 received from the one or more communication devices comprises mapping
11 the user interaction data to corresponding geographic locations occurring
12 within the communication network to generate the geo-centric statistical
13 information associated with the geographic locations.

14

15 61. The method of claim 33, further comprising:

16 the one or more communication devices performing one or more
17 diagnostic tests of the communication network in a diagnostic mode of
18 operation in accordance with a diagnostic criterion downloaded to the one or
19 more communication devices from the communication network via the
20 communication link in response to the one or more network performance
21 problems identified during analysis of the user interaction data.

22

23 62. The method of claim 33, wherein transmitting the user interaction data
24 to the communication network comprises:

25 transmitting the user interaction data to a collection communication
26 device of the plurality of communication devices that transmits the user
27 interaction data to a server of a network operator of the communication
28 network.

29

63. The method of claim 33, wherein transmitting the user interaction data to the communication network comprises:

receiving multiple user interaction data from other communication devices of the plurality of communication devices in the communication network;

aggregating the multiple user interaction data with the user interaction data generated by the communication devices to generate aggregate user interaction data; and

transmitting the aggregate user interaction data to the communication network via the communication link.

64. The method of claim 33, further comprising:

a network operator of the communication network broadcasting a group functional definition to a group of communication devices of the plurality of communication devices, wherein said group functional definition overrides the functional definition of each communication device of the group.

65. The method of claim 64, wherein a collector communication device of the group receives the group functional definition and distributes the group functional definition to other communication devices of the group.

66. The method of claim 64, wherein the group functional definition comprises a group diagnostic criterion that causes the group of communication devices to operate in a diagnostic mode of operation in accordance with the group diagnostic criterion.